1st DRAFT

MEMORANDUM

To: Tim Larson, DER

From: Emmy Thomee, DFWMR Coordinator, Onondaga Lake Remediation/Restoration Project

Subject: Allied's Onondaga Lakebottom OLSQVs - Brief Evaluation and Suggestions for Revision and Future Use

Date: October 1, 1999

Perspective

Utilization of site-specific OLSQVs (developed from "AET' or "triad" trends seen in the relationships between colocated sediment chemistry, sediment toxicity, and benthic invertebrate community data) for sediment risk assessment purposes, done correctly, is appropriate for assisting in assessment of potential risk of contaminated sediments to benthic macroinvertebrates. However, this method does not address risks to higher trophic level endpoints, such as fish and piscivorous wildlife, which must be protected as well, and which may feed on tolerant invertebrate species which bioaccumulate contaminants. Therefore, with the understanding that OLSQVs are appropriate only for benthic macroinvertebrate protection, that sediment levels protective of higher trophic level receptors are likely to be consistently lower, and that OLSQVs are but one of several tools to evaluate risk to the lake ecological system to be protected, we offer the following summary of concerns and suggestions.

Problems with Current OLSQVs

General - Limitations of OLSQVs should be pointed out. For example, there may be insufficient data to support the OLSQV approach for all the SOCs in Tables 5-2 and 5-3, especially if correlations or regression analyses are done (which is desirable). Appropriateness of statistics used was not discussed. Toxicity and biomass information was taken from the same test. No synergistic or additive effects can be addressed by this AET method, nor can distinction be made between effects of different contaminants. Toxicity testing and benthic community analysis are used to set OLSQVs, and also to support them - therefore are not independent. To be independent, would need to compare sediment chemistry with Ontario (and other) values, toxicity with a control, and benthic communities with approved reference stations. 95% confidence limits for each COC were not used.

Inorganics - Chronic values have not been provided. Primary values are based on survival, and secondary screening levels, based on chironomid biomass, are closer to Ontario SELs than LELs which (when accompanied by concerns below) reduces their credibility.

- AVS (and TOC) were used to justify very high screening values. This is inappropriate because AVS varies temporally, spatially, independently of metals

concentration, with lake turnover, stratification and oxygenation, it was only used with methyl Hg instead of total Hg, and AVS was developed only for evaluation of acute toxicity, not chronic. Both AVS and TOC will vary with natural or engineered changes in lake eutrophic status (such as HypOx or reduced sewage loading), increasing toxicity. Any of these considerations would significantly lower the screening values. SEM/AVS per DiToro '90 was not provided (p. 5-45).

- Static toxicity test, instead of flowthrough ones, were used. This reduces toxicity of contaminants significantly and is inconsistent with currently recommended methods.

Organics - *Primary screening values* are based on acute bioassay measures only (short term survival of two species), are often an order of magnitude greater than Ontario and NYS guidance numbers for acute benthic toxicity, and used different sediment depths for chemistry analysis and toxicity tests.

- *Secondary screening values* are based on biomass, and benthic community alteration data which were inadequately interpreted (per Bode comments already shared). Definitions of impacts as "major," "moderate" and "minimal" were not provided. Tolerance of species found to conditions present was not discussed. Reinterpretation, and inclusion of "minimal" impacts as impacts, would lower the screening values.

Recommendations for Acceptable Use of OLSQVs

General

First, to avoid unnecessarily dwelling on revision of methodology or assumptions, we suggest first applying the Ontario guidance directly to lake data to determine whether this leads to different conclusions about risk than have already been reached. If not, effort may be saved in extensively revising assumptions and reanalyzing data.

Second, to achieve and acceptable chronic value for the sediment screening, one may apply the standard acute:chronic uncertainty factor of 0.1.

Finally, revisons of interpretation of data (including new data) should be done, as follows.

Specific

- Chronic values for protection of benthic fauna, other than evaluation of benthic community ecology, must be specifically provided. One option for developing them is to repeat toxicity tests using flowthrough methods for chronic measurement endpoints. Among options we recommend is a 10-day *Hyalella* reproduction and Microtox test.
- Based on the likelihood of lake sediment disturbances, including bioturbation, and on recognition that attempted manipulations of lake trophic level are currently planned, it should be assumed that benthic biota have access to, and may concentrate sediments 6" or more deep, and make them available to higher trophic level organisms. Sediment samples ideally should be from 15 cm, not the top 2 cm.
- Reference lake should be analyzed for sediment chemistry to determine its appropriateness for representing "background"for evaluation of Onondaga Lake chemistry, toxicity and invertebrate communities.
- Calculations for each OLSQV, including toxicity and community data, should be made available along with evaluation of the specific factors which may have caused the large discrepancy between commonly accepted values (Ontario and NOAA). Where appropriate, these data should be statistically treated.

- AVS should be dropped.
- Dr. Bode's benthic community analysis should be accepted, with acknowledgment of correspondence between community impacts and distribution of toxic contaminants. Benthic community data may be considered for use in determining primary, instead of secondary screening values, since these data encompass both lethal and sublethal effects.
- Area of exceedences (using approved screening levels) should be presented for each SOC, and/or group of SOCs.

Protection of Higher Trophic Levels

In addition to doing HQs with appropriately conservative assumptions (such as using highest concentrations of COC instead of mean), we recommend backcalculating from conservative NOAELs for top trophic level fish and piscivorous wildlife, using actual worst-case feeding scenarios, actual whole body fish tissue levels and possibly including actual BAFs from Allied data on different trophic levels collected for use in the ERA, to find protective sediment and surface water levels of specific chemicals for different trophic levels of organisms utilizing the lake and consuming its biota.

Measurement endpoints would include new sediment, water and fish tissue data (including PCBs in water), and assessment endpoints would include exceedences of state and federal SCGs and ARARs for protection on fish and wildlife, and of levels known to have adverse impacts on sensitive species of fish and wildlife species which should be present at the lake.

Conclusions about food chain risks should be presented for each COC. Probabilistic analysis is not recommended.

ec: Gina Ferreira, EPA
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ett/lakeera.olsqvs.

Gina - Where in ERAGS do OLSQVs fit ????
Mark - please especially check that you get the language you want for redline portion on Hyalella....which I am unclear on...